http://www.epa.gov/rpdweb00/heast/
Last updated on Thursday, November 15th, 2007.

Radiation Protection

Radionuclide Carcinogenicity Slope Factors: HEAST

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The following pages provide the latest information and guidance on using radionuclide slope factors from the Health Effects Assessment Summary Tables (HEAST) - Radionuclides Table (formerly Table 4).

EPA, other federal agencies, states, and contractors who are responsible for the identification, characterization, and remediation of sites contaminated with radioactive materials use radionuclide slope factors in risk assessments to calculate potential risks to the general public. EPA classifies all radionuclides as known human cancer causing agents (Group A carcinogens).

EPA calculates radionuclide slope factors to assist risk assessors with risk-related evaluations and decision-making at various stages of the remediation process. The HEAST - Radionuclide Table lists ingestion, inhalation and external exposure cancer slope factors for radionuclides in units of picocuries (pCi).

You can view and download the User's Guide and the Radionuclide Table from the Download Area.

April 16, 2001 Update: Radionuclide Toxicity

This update of the HEAST for radionuclides incorporates all new values, based on Federal Guidance Report No. 13 (1), which was developed by EPA's Office of Radiation and Indoor Air (ORIA). Federal Guidance Report No. 13 incorporates state-of-the-art models and methods that take into account age- and gender-dependence of radionuclide intake, metabolism, dosimetry, radiogenic cancer risk, and competing risks. Major differences between the risk coefficients of Federal Guidance Report No. 13, as incorporated into the current radionuclide slope factors, and the preceding generation of radionuclide slope factors (published in the November 1995 HEAST) include the following:

- consideration of revised dosimetric models, including a revised lung model and age-dependent biokinetic models and GI-absorption factors for internal dose estimates and revised external dose coefficients for external dose estimates
- consideration of age- and gender-dependent inhalation and ingestion rates

- incorporation of updated vital statistics and baseline cancer mortality data
- specification of separate values for ingestion of water, food products, and soil(2), based on the different age-dependent intake rate functions for these materials, instead of the single ingestion value for each radionuclide presented previously.

The age- and gender-specific radiogenic cancer risk models for each of the 14 potential cancer sites used to compute the risk coefficients in Federal Guidance Report No. 13 are similar to those used for previous radionuclide slope factor calculations, based on the EPA report, Estimating Radiogenic Cancer Risk (3). However, these risk models have been updated to incorporate more recent baseline cancer mortality data and other minor adjustments. The estimate of total radiogenic cancer risk attributable to uniform total-body exposure from low doses of low-LET radiation has increased by approximately 11-13% from the previous estimates, primarily due to changes in the baseline cancer mortality rates for the U.S. population.

Download Area

The documents below are in Adobe Acrobat and WordPerfect 9 format. As of April 16, 2001, this page has the current and correct Radionuclide Table (formerly HEAST Slope Factors - Table 4)

User's Guide

The user's guide describes the derivation of the slope factors in the Radionuclide Table, information about the table, and contact information.

User's Guide (55 Kb Word Perfect® 9 format)

User's Guide (12pp, 29 Kb [about pdf format])

Radionuclide Table

The Radionuclide Table, formerly HEAST Table 4, lists ingestion, inhalation and external exposure cancer slope factors (risk coefficients for total cancer morbidity) for radionuclides in conventional units of picocuries (pCi).

Radionuclide Table (914 Kb Word Perfect® 9 format)

Radionuclide Table (72pp, 1194 Kb [about pdf format])